

OS Assignment 3

Shahu Ronghe (sronghe1)
Shantanu Walunj (swalunj1)

Part A:

Successfully accessed Virtual Machine with given IP and password using SSH.

Part B:

Successfully demonstrated the insertion and removal of the Kernel Module.

```
[1493036.363210] mymodule: Hello World!  
[1493076.340980] mymodule: Hello world!  
[1493138.490522] mymodule: 0: Goodbye, cruel world!!  
[1493140.897682] mymodule: Hello world!  
[1493140.897755] mymodule: Hello world!  
[1493140.897833] mymodule: Hello world!  
[1493140.897902] mymodule: Hello world!  
[1493140.897971] mymodule: Hello world!  
[1493179.976427] mymodule: 0: Goodbye, cruel world!!  
[1493179.976511] mymodule: 1: Goodbye, cruel world!!  
[1493179.976589] mymodule: 2: Goodbye, cruel world!!  
[1493179.976614] mymodule: 3: Goodbye, cruel world!!  
[1493179.976632] mymodule: 4: Goodbye, cruel world!!  
sronghe1@CS550-sronghe1:~/playground$
```

We have learnt how the inserting and removing of kernel module is performed. Also, how to declare module parameters in the program. We have also learnt to check kernel level log messages either by “dmesg” command or opening “/var/log/kern.log”.

Part C:

Successfully modified the `misc_sample.c` program to have the `.read` function which will return “Hello World!” to the user-space program.

```
sronghe1@CS550-sronghe1:~/operating-systems-CS-550/assignment-3/charDriver$ gcc user_program.c -o user  
sronghe1@CS550-sronghe1:~/operating-systems-CS-550/assignment-3/charDriver$ sudo ./user  
data from kernel: Hello World!  
sronghe1@CS550-sronghe1:~/operating-systems-CS-550/assignment-3/charDriver$
```

We have learnt that how the `.read` `.write` are useful to communicate with kernel modules. Implemented a read function which will copy the string to the user-space buffer by using `copy_to_user` function. Also, we have learnt about the user-space program and how to call the read function of the kernel module.

Part D:

Explored the kernel code v4.15 on bootlin referencer. Gone through ‘ipc’, ‘init’, ‘fs’, ‘init’, etc directories, ipc contains implementation of various ipc such as shared memory in `shm.c`, message queue in `mqueue.c`, etc.

Generated cscope database on linux-4.15.1 kernel image and search for couple of references. It is very easy and efficient tool for browsing the kernel code.